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*c/o London Museum of Archaeology*
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03-4 & 03-5

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The next speaker's night, Thursday, September 11th, is fast approaching. Katherine McMillan will be the speaker and her talk is entitled ***Interpreting Early Archaic Technological Change: A View from the Nettling Site***.

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As always, our meeting will be held at 8 pm at the London Museum of Archaeology, 1600 Attawandaron Road, near the corner of Wonderland & Fanshawe Park Road, in the northwest part of the city.

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# EXPLORING CHERT USE PATTERNS WITHIN IROQUOIAN SITES USING A GEOGRAPHICAL INFORMATION SYSTEM

**James R. Keron**

## INTRODUCTION

This paper explores the intra-site patterning of the chipped lithic material on five Iroquoian sites in the London area. Twenty years ago the London Chapter of the Ontario Archaeological Society conducted test excavations at the Harrietsville Site (AfHf-10), a late pre-contact earthwork-protected Neutral village site located in North Dorchester Township, Middlesex County, Ontario (Keron 1983, 1986). This site had been visited by David Boyle in the late 19th century (1896) who observed and recorded the earthworks that were then still intact on the western side of the site. During the course of the London Chapter testing, samples were taken from two readily identifiable middens and two trenches were opened in an attempt to locate settlement patterns. In analyzing the debitage from the two middens a difference in frequencies of chert types in the two middens was noted. Of the identifiable (i.e. unburned) debitage, one midden contained 3.6% Kettle Point chert while the other contained 25.2% (Keron 1986:115). At the time it was suggested that this might be reflective of the historically recorded situation (Tooker 1991; Trigger 1987) where lineages owned and controlled trade routes. It was reasoned that as members of real or even fictive lineages tended to reside together in a longhouse and that members of a longhouse would tend to use a nearby midden, that different percentages of Kettle Point chert within this site derived from ownership of the trade route that imported Kettle Point chert. It was also acknowledged that it could result from the idiosyncratic behaviour of one or more individuals that preferred Lake Huron beaches to the local mosquito population during the summer months. Taking this observation as a starting point, if lineages do control trade routes then a reasonable and testable hypothesis is that this same pattern should repeat consistently on other Iroquoian sites.

In approaching this analysis, one way would be to do an analysis of chert frequencies from midden deposits from other sites excavated in a similar manner to that which was done at Harrietsville. However, while a number of middens have been excavated in the London area, there are not really any large scale excavations on the same site, so the sample would be very spotty. There are, however, a number of Controlled Surface Pickups (CSP) where surface material from the entire site was collected and the horizontal provenience carefully recorded primarily to determine the extent of the site. Given that lithic detritus occurs in large numbers and that, with a CSP, the location of each piece is known, then an analysis of the lithic detritus should be capable of providing information on internal patterning of activities and raw materials within a site. Consequently, five sites that have had a CSP conducted on them were selected for internal analysis. These consisted of two Late Ontario Iroquoian (LOI) sites (Brian [AfHf-10] and Cassandra [AfHh-65]), two Middle Ontario Iroquoian (MOI) sites (Drumholm [AfHi-22] and Dorchester Village [AfHg-24]), and one Early Ontario Iroquoian (EOI) site (Mustos [AfHg-2]). The approximate locations of these sites is shown in Figure 1. The assignment of these sites to time periods follows J. V. Wright's (1966) subdivisions of the Ontario Iroquoian Tradition.

## TYPOLOGICAL DEFINITIONS

Each piece of lithic detritus/debris considered in the analysis was assigned a type for chert source as well as type. The analytical procedures applied to the debitage are described in detail elsewhere (Keron well as type. The analytical procedures applied to the debitage are described in detail elsewhere (Keron 2003a). However, a brief description follows.

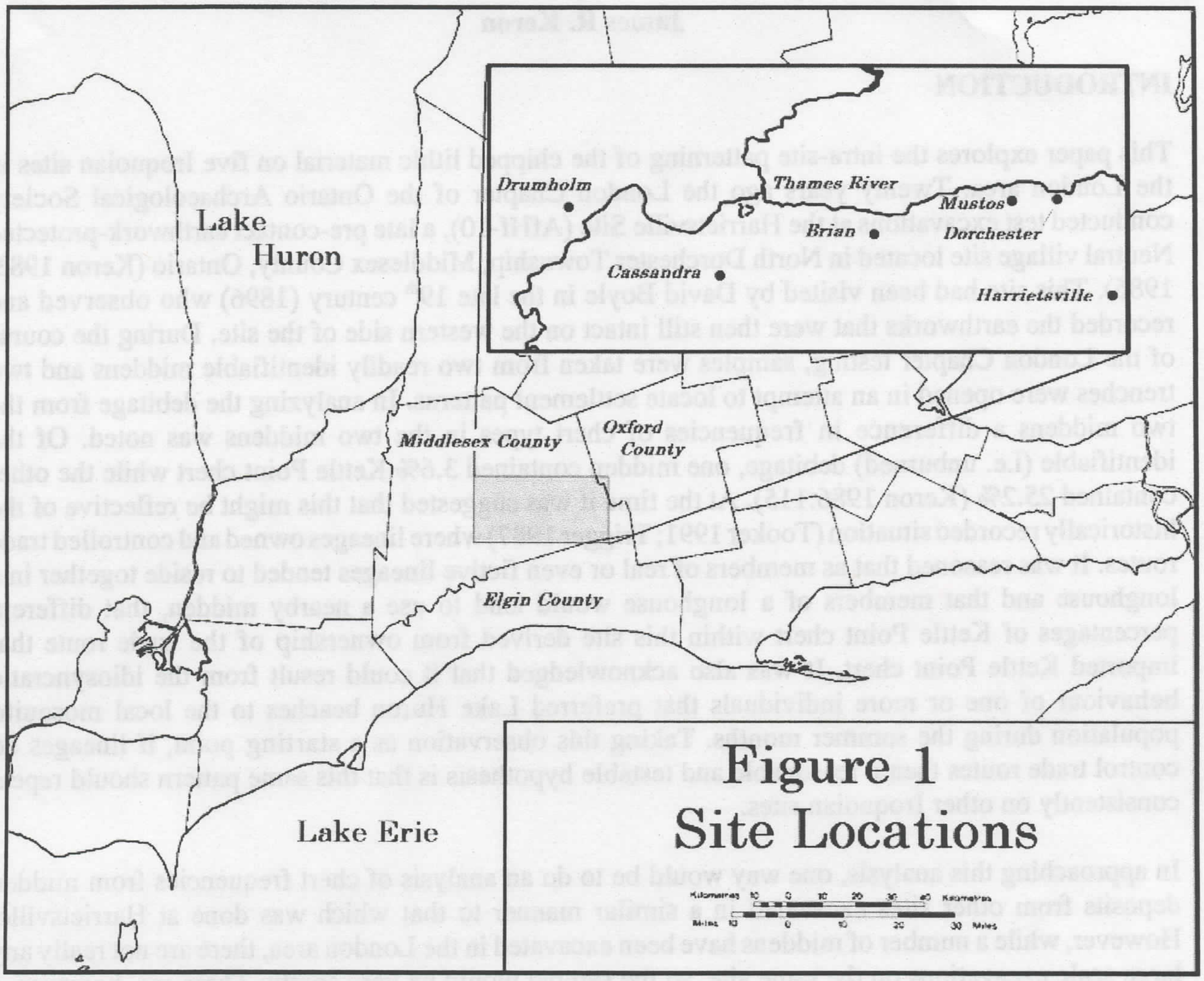


Figure 1
Site Locations

Chert sources assigned were Kettle Point, which outcrops west of the study area along the Lake Huron shoreline, Onondaga chert, which outcrops along the Lake Erie shoreline east of Long Point and local till chert, which is found as secondary deposits throughout the study area. All other identifiable chert sources were simply lumped together as "other chert". Given the demonstrated differences (Keron 2003b) of various analysts in distinguishing Onondaga chert from local till chert all of the assignment was done by myself to at least ensure a consistent assignment for all reported material. The final type assigned to chert source was labeled "unidentifiable". Included in this category are all pieces that could not be identified as to source due to, generally, two reasons. Frequently debitage has been burned, making identification problematic. The other reason to classify a piece as unidentifiable is when the flake is too small to allow reliable identification. In retrospect the term was poorly chosen. Finally, with respect to chert types, the percentages of "identifiable"chert (e.g. Kettle Point, Onondaga, other and local till) reported for various site areas are exclusive of unidentifiable chert; that is, unidentifiable chert is not included in the formula. For example, the percentage of Kettle Point chert in a given area is calculated as follows:

$$\%KPC = n\,KPC / (nKPC + nOnondaga + nLocalTill + nOther)*100$$

The reason for this is that "unidentifiable chert" is not a specific chert source that was exploited by the native inhabitants. It is composed of burned and otherwise unidentifiable pieces that were at one time from an identifiable source such as Kettle Point. Consequently, including it in the percentages would distort the reality. Two otherwise identical samples would appear different if one had been subjected to more burning. Note that it is analytically useful to talk about the percentage of unidentifiable chert in any given area as this reflects a cultural reality.

To identify various kinds of flakes a stage typology was chosen as this could be used to directly infer various kinds of reduction activity carried out on each site. While a number of types was used, only five occurred in any kind of numbers to allow statistical analysis. The five types are:

### 1. Decortication Flakes

These represent the initial stage in core reduction involving the removal of the cortex from the initial block of chert. The category as used here includes White's (1963) primary and secondary decortication flakes. Cortex as defined includes the original interface to the surrounding source matrix, or weathered surfaces or surfaces with patina. Weathered could include both crushing from action in the glacial till or smoothing through being water rolled.

*Attributes:*

- Presence of substantial (>20%) cortex located other than on the striking platform
- Striking platform has very few facets (<3)
- Striking platform at approximately $90^0$ to ventral surface
- Pronounced bulb of percussion
- Dorsal surface has low number of scars
- Generally, on average it is a larger size but there is a considerable range of variation
- Ventral surface is usually straight lacking much curvature

### 2. Core Trimming Flakes

These flakes are produced during core reduction. They can be flake blanks or attempted flake blanks where the purpose is to obtain a flake for either expedient use or manufacture into a more formal tool. They also include generally smaller flakes which were removed in the process of preparing the core for the removal of a flake blank. Flakes in this category are generally indicative of the later stages of core reduction as they lack cortex.

*Attributes:*

- No cortex on surfaces other than the striking platform or less than 20% of the dorsal surface
- Striking platform has few facets (<3)
- Striking platform at approximately right angles to ventral surface
- Bulb of percussion present
- Dorsal surface has relatively low number of scars
- Variable sizes. Larger flakes may be blanks, smaller are preparation flakes

## 3. Bifacial Retouch Flakes

This type results from flake removal during biface reduction. As Iroquoian bifaces are generally small these flakes are also small, being around 1 cm in size. In earlier times, bifacial cores were used but these are not found on Iroquoian sites. For a description see Deller and Ellis (1992) and Frison (1968).

*Attributes:*

- Thin and flat transverse cross section lacking pronounced dorsal ridges
- Thin longitudinal cross section
- Frequently curved so the flake is concave on the ventral surface
- Feathered edges both laterally and distally
- High number of dorsal flake scars
- Striking platform faceted, narrow, lipped, sometimes ground
- Little or no cortex on dorsal face
- Expanding flake shape
- Small or subdued bulb of force
- Acute platform to dorsal angle

## 4. Shatter

This category derives from core reduction when fracture planes are encountered in reducing a core. Instead of producing a classic core reduction flake, portions of the core will break off along pre-existing lines of weakness encountered in the core creating blocky chert fragments. In some sites in the study area where natural chert is common in the till, distinguishing culturally created shatter from shatter produced by modern farming practices can be problematic. For a more detailed discussion see Ahler (1989) and Binford and Quimby (1963).

*Attributes:*

- No clear ventral or dorsal surface
- No visible negative bulbs of percussion
- No systematic alignment of cleavage scars
- No orientation - distal or proximal, dorsally or ventrally
- Blocky fragments

## 5. Fragmentary Flakes

This type represents simply the medial/distal portions of a broken flake.

*Attributes:*

- No striking platform
- Clear dorsal and ventral surfaces
- Break termination proximally

## ANALYTICAL PROCEDURES

In conducting the spatial analysis, each flake was typed for the chert source and the flake type as described above. This information and the catalog number of each was recorded in a spreadsheet on an item by item basis. The horizontal provenience data occurred in two main forms, one where a transit had been used to record the location so that a distance and direction was recorded and the other where a compass had been used so that two directions were recorded from two known points. Both of these were turned into Cartesian co-ordinates using spreadsheet calculations available on the web site of the London Chapter of the OAS (Keron and Prowse 2001). Using spreadsheet look up functions, each flake was then matched to the appropriate find spot and the Cartesian co-ordinates added to it giving a spreadsheet that has the catalog number, the chert source, the flake type and the X-Y coordinates of the location. Further analysis was based on this file.

The next stage of the analysis dealt with the frequency of various flake and chert source types between different areas within the site looking for differences that were statistically significant. To conduct this analysis a Geographical Information System (GIS) was used to both map the site and perform the statistical calculations for each sub-area of the site using the file with the type and location information. This procedure has the enormous advantage of greatly facilitating conducting many iterative "what-if" analyses.

While the details of the GIS scripts and statistical procedures are available on the web site of the London Chapter of the OAS (Keron 2003c), a brief description follows. First, several GIS "maps" were produced showing the location of each flake of a specific chert or flake type. For example, one map would plot all Kettle Point chert flakes and another would plot all bifacial retouch flakes. While it would have been informative to be able to drive the analysis down to the point where chert source and flake type were combined as in, for example, all Kettle Point chert flakes of bifacial retouch, the samples were not large enough to permit this kind of analysis.

The next step in the analysis, and the point around which a number of iterations occurred for each site, was to develop a map of the site that would divide it up into various zones that could then be tested for differential distribution of chert source type and flake type. Ideally, this division of the site into analytical units of area should be done using culturally defined areas such as middens or longhouses. However, as we are dealing with CSP collections, the longhouse locations are not known. A general process was developed where the site was divided up into midden areas and non-midden areas. The non-midden areas were created by grouping all points within the site together that were closest to each midden. Thus, for the Brian site, there are seven defined middens and seven interior site areas, one interior area for each of the closest middens. See Figure 2 for an example. In other cases, where there were no defined midden areas the analysis had to proceed by trial and error. In the subsequent analysis, division into cultural areas is described for each site.

Once the cultural areas had been defined for a particular iteration, a GIS script was used to process the data. For the particular attribute under consideration (e.g. Kettle Point chert flakes), this script calculated, for each individual cultural area, the frequency of occurrence (number of occurrences of the specific type divided by the total occurrences of all types), the total occurrences of all types, the range of a confidence interval based on the sample size, and a map of the various areas with the analyzed flakes plotted. The calculated data were found in the legend. Where the confidence intervals do not overlap, there is a statistically significant difference in the particular attribute being considered in its distribution over the site. Where the confidence intervals do overlap, it was necessary to take the frequency and total of all types for the area to a spreadsheet for more detailed calculations to determine statistically significant differences. The differences that were significant were then shaded on the map using a feature of the GIS. Thus, in analyzing chert source types, for example, four maps resulted, one looking at the distribution of unidentifiable or burned chert and three for each of Kettle Point chert, Onondaga chert and local till chert. "Other" chert was examined initially but as the numbers are very small, no statistically significant differences arose so this was subsequently abandoned. For flake types, five maps were created, one for each of the predominant flake types (decortication, core trimming, bifacial retouch, fragment and shatter). Again, for a detailed description of the GIS methodology see Keron (2003c).

The ease with which one can generate various iterations of distributions across differently defined cultural areas of the site is a two-edged sword. While it is highly productive from the aspect of analytical effort required, a great number of maps, legends and associated images were generated making inclusion of all of these in the following analysis prohibitive. Space simply will not allow it. Consequently, in most cases, a single map of the analytical units used for each site is included. All observations are statistically significant unless otherwise noted. Each observation is numbered for later reference.

The tables of the calculated results comparing the differences between each pair of areas in each site are included at the end and the areas that have frequencies that are different with statistical significance are shaded in the table. The observations are based primarily on these tables.

## BRIAN SITE ANALYSIS

The Brian site (AfHh-10) is a late prehistoric LOI village of approximately 2.5 ha. A detailed CSP was conducted on the site in 1988 by Peter Timmins for the London Museum of Archaeology. While earlier and later work was done on the site, this sample forms the basis of the following analysis. As there are well-defined middens, these were used to define the cultural areas as described above. There are seven middens and consequently seven interior areas defined by their proximity to the nearest midden. The cultural areas were assigned numbers as show in Figure 2. The midden numbers are those defined by Timmins (personal communication 2002). The statistical data used to develop this analysis is presented in Tables 1 through 5 .

### Chert Type Observations

During the initial part of the analysis, it appeared as though burned chert and larger pieces of debitage like shatter and cores were more common in the middens. Accordingly, an analysis was done whereby the site was separated into two areas, one the midden areas, and the other, all non-midden areas. The chert types and flake types were run through this analysis to the effect that there was little patterning that was statistically significant with the following single exception,

1. Local till chert was more often found in the middens than other areas of the site.

However, as this leaves open the possibility that different middens were used in different fashions so that one might be high in burned chert but another not, the second analysis was done using all the fourteen cultural areas as defined above. This analysis failed to show any differences. Most of the frequencies of burned chert were in the same general range.

2. The single exception was that Area 3 has a lower frequency of unidentifiable chert than did Midden 4.

### Table 1: Brian Site Chert Source Percentages by Area

| Area | Total n | Kettle Point Chert |  | Onondaga Chert |  | Local Till Chert |  | UID Chert |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  | % | SE | % | SE | % | SE | Total n | % | SE |
| Area 1 | 52 | 9.6 | 8.0 | 23.1 | 11.5 | 65.4 | 12.9 | 61 | 14.8 | 8.9 |
| Area 2 | 108 | 25.0 | 8.2 | 16.7 | 7.0 | 57.4 | 9.3 | 131 | 17.6 | 6.5 |
| Area 3 | 54 | 24.1 | 11.4 | 27.8 | 11.9 | 44.4 | 13.3 | 63 | 14.3 | 8.6 |
| Area 4 | 11 | 18.2 | 22.7 |  |  | 72.7 | 26.3 | 14 | 21.4 | 21.5 |
| Area 5 | 2 |  |  |  |  |  |  | 3 | 33.3 | 53.3 |
| Area 6 | 23 | 4.3 | 8.3 | 21.7 | 16.9 | 73.9 | 17.9 | 31 | 25.8 | 15.4 |
| Area 7 | 8 | 37.5 | 33.5 | 37.5 | 33.5 | 12.5 | 22.9 | 12 | 33.3 | 26.7 |
| Midden 1 | 58 | 13.8 | 8.9 | 6.9 | 6.5 | 75.9 | 11.0 | 75 | 22.7 | 9.5 |
| Midden 2 | 72 | 19.4 | 9.1 | 20.8 | 9.4 | 58.3 | 11.4 | 86 | 16.3 | 7.8 |
| Midden 3 | 63 | 19.0 | 9.7 | 19.0 | 9.7 | 61.9 | 12.0 | 79 | 20.3 | 8.9 |
| Midden 4 | 58 | 10.3 | 7.8 | 19.0 | 10.1 | 69.0 | 11.9 | 80 | 27.5 | 9.8 |
| Midden 5 | 23 | 17.4 | 15.5 | 17.4 | 15.5 | 60.9 | 19.9 | 27 | 14.8 | 13.4 |
| Midden 6 | 2 |  |  |  |  |  |  | 7 | 71.4 | 33.5 |
| Midden 7 | 15 | 6.7 | 12.6 | 6.7 | 12.6 | 80.0 | 20.2 | 23 | 34.8 | 19.5 |

### Table 2: Brian Site Flake Type Percentages by Area

| Area | Total n | Decortication |  | Core Trimming |  | Bifacial Retouch |  | Shatter |  | Fragment |  |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | % | SE | % | SE | % | SE | % | SE | % | SE |
| Area 1 | 61 | 14.8 | 8.9 | 45.9 | 12.5 | 6.6 | 6.2 | 4.9 | 5.4 | 27.9 | 11.3 |
| Area 2 | 131 | 10.7 | 5.3 | 37.4 | 8.3 | 8.4 | 4.7 | 8.4 | 4.7 | 35.1 | 8.2 |
| Area 3 | 63 | 14.3 | 8.6 | 44.4 | 12.3 | 14.3 | 8.6 | 4.8 | 5.3 | 22.2 | 10.3 |
| Area 4 | 14 | 14.3 | 18.3 | 50.0 | 26.2 | 14.3 | 18.3 |  |  | 21.4 | 21.5 |
| Area 5 | 3 |  |  | 100.0 |  |  |  |  |  |  |  |
| Area 6 | 30 | 23.3 | 15.1 | 33.3 | 16.9 | 10.0 | 10.7 |  |  | 33.3 | 16.9 |
| Area 7 | 12 |  |  | 16.7 | 21.1 | 25.0 | 24.5 | 8.3 | 15.6 | 50.0 | 28.3 |
| Midden 1 | 77 | 6.5 | 5.5 | 41.6 | 11.0 | 10.4 | 6.8 | 10.4 | 6.8 | 31.2 | 10.3 |
| Midden 2 | 85 | 14.1 | 7.4 | 28.2 | 9.6 | 9.4 | 6.2 | 12.9 | 7.1 | 35.3 | 10.2 |
| Midden 3 | 78 | 14.1 | 7.7 | 33.3 | 10.5 | 10.3 | 6.7 | 5.1 | 4.9 | 37.2 | 10.7 |
| Midden 4 | 80 | 17.5 | 8.3 | 45.0 | 10.0 | 6.3 | 5.3 | 5.0 | 4.8 | 26.3 | 9.6 |
| Midden 5 | 27 | 7.4 | 9.9 | 44.0 | 18.7 | 7.4 | 9.9 | 3.7 | 7.1 | 37.0 | 18.2 |
| Midden 6 | 7 | 14.3 | 25.9 |  |  |  |  | 14.3 | 25.9 | 71.4 | 33.5 |
| Midden 7 | 22 | 13.6 | 14.3 | 31.8 | 19.5 | 18.2 | 16.1 | 13.6 | 14.3 | 22.7 | 17.5 |

For the remaining analysis unidentifiable chert was excluded from the calculations as it does not represent a real type in the sense of Kettle Point or Onondaga chert. Consequently, its inclusion would distort the actual frequencies of identifiable chert. For example, two sites with identical chert use would have different percentages of identified source cherts if one site had more of the total burned than did the other. This assumes, of course, that there was no differential burning of chert. In proceeding with the analysis of chert source type using the fourteen cultural areas, the following observations were made.

## Table 3: Brian Site Kettle Point Chert Differences by Area*

| Area | Total N | | Area 1 | | Area 2 | | Area 3 | | Area 4 | | Area 6 | | Area 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 52 | | 108 | | 54 | | 11 | | 23 | | 8 | |
| | | Freq | 0.096 | | 0.25 | | 0.241 | | 0.189 | | 0.043 | | 0.375 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 52 | 0.096 | | | | | | | | | | | | |
| Area 2 | 108 | 0.25 | **0.154** | **0.114371** | | | | | | | | | | |
| Area 3 | 54 | 0.241 | **0.145** | **0.139371** | -0.009 | 0.140294 | | | | | | | | |
| Area 4 | 11 | 0.189 | 0.093 | 0.24483 | -0.061 | 0.245357 | -0.052 | 0.25796 | | | | | | |
| Area 5 | 2 | 0 | | | | | | | | | | | | |
| Area 6 | 23 | 0.043 | -0.053 | 0.115259 | **-0.207** | **0.116373** | **-0.198** | **0.141019** | -0.146 | 0.245772 | | | | |
| Area 7 | 8 | 0.375 | 0.279 | 0.344903 | 0.125 | 0.345277 | 0.134 | 0.354344 | 0.186 | 0.407526 | 0.332 | 0.345572 | | |
| Midden 1 | 58 | 0.138 | 0.042 | 0.119542 | -0.112 | 0.120617 | -0.103 | 0.144541 | -0.051 | 0.24781 | 0.095 | 0.121459 | -0.237 | 0.347024 |
| Midden 2 | 72 | 0.194 | 0.098 | 0.121467 | -0.056 | 0.122525 | -0.047 | 0.146137 | 0.005 | 0.248744 | **0.151** | **0.123354** | -0.181 | 0.347692 |
| Midden 3 | 63 | 0.19 | 0.094 | 0.125681 | -0.06 | 0.126704 | -0.051 | 0.149658 | 0.001 | 0.250829 | **0.147** | **0.127506** | -0.185 | 0.349187 |
| Midden 4 | 58 | 0.103 | 0.007 | 0.111941 | **-0.147** | **0.113088** | -0.138 | 0.13832 | -0.086 | 0.244234 | 0.06 | 0.113986 | -0.272 | 0.34448 |
| Midden 5 | 23 | 0.174 | 0.078 | 0.174405 | -0.076 | 0.175143 | -0.067 | 0.192402 | -0.015 | 0.278453 | 0.131 | 0.175724 | -0.201 | 0.36953 |
| Midden 6 | 2 | 0 | | | | | | | | | | | | |
| Midden 7 | 15 | 0.067 | -0.029 | 0.149736 | **-0.183** | **0.150595** | **-0.174** | **0.17036** | -0.122 | 0.263705 | 0.024 | 0.151271 | -0.308 | 0.358548 |

| Area | Total N | | Midden 1 | | Midden 2 | | Midden 3 | | Midden 4 | | Midden 5 | | Midden 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 58 | | 72 | | 63 | | 58 | | 23 | | 2 | |
| | | Freq | 0.138 | | 0.194 | | 0.19 | | 0.103 | | 0.174 | | 0 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Midden 2 | 72 | 0.194 | 0.056 | 0.127365 | | | | | | | | | | |
| Midden 3 | 63 | 0.19 | 0.052 | 0.131391 | -0.004 | 0.133144 | | | | | | | | |
| Midden 4 | 58 | 0.103 | -0.035 | 0.118315 | -0.091 | 0.12026 | -0.087 | 0.124515 | | | | | | |
| Midden 5 | 23 | 0.174 | 0.036 | 0.178563 | -0.02 | 0.179857 | -0.016 | 0.18273 | 0.071 | 0.173566 | | | | |
| Midden 6 | 2 | 0 | | | | | | | | | | | | |
| Midden 7 | 15 | 0.067 | -0.071 | 0.154559 | -0.127 | 0.156052 | -0.123 | 0.159355 | -0.036 | 0.148758 | -0.107 | 0.200038 | 0.067 | 0.126529 |

* Statistically significant differences are highlighted.

## Table 4: Brian Site Onondaga Chert Differences by Area*

| Area | Total N |  | Area 1 |  | Area 2 |  | Area 3 |  | Area 4 |  | Area 6 |  | Area 7 |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | Total N | 52 |  | 108 |  | 54 |  | 11 |  | 23 |  | 8 |  |
|  |  | Freq | 0.231 |  | 0.167 |  | 0.278 |  | 0 |  | 0.217 |  | 0.375 |  |
|  |  | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 52 | 0.231 |  |  |  |  |  |  |  |  |  |  |  |  |
| Area 2 | 108 | 0.167 | -0.064 | 0.134431 |  |  |  |  |  |  |  |  |  |  |
| Area 3 | 54 | 0.278 | 0.047 | 0.165537 | 0.111 | 0.138663 |  |  |  |  |  |  |  |  |
| Area 4 | 11 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| Area 5 | 2 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| Area 6 | 23 | 0.217 | -0.014 | 0.203723 | 0.05 | 0.182559 | -0.061 | 0.20654 |  |  |  |  |  |  |
| Area 7 | 8 | 0.375 | 0.144 | 0.3545 | 0.208 | 0.342776 | 0.097 | 0.356126 |  |  | 0.158 | 0.375402 |  |  |
| Midden 1 | 58 | 0.069 | -0.162 | 0.131827 | -0.098 | 0.095933 | -0.209 | 0.136139 |  |  | -0.148 | 0.18065 | -0.306 | 0.341763 |
| Midden 2 | 72 | 0.208 | -0.023 | 0.14803 | 0.041 | 0.117208 | -0.07 | 0.151884 |  |  | -0.009 | 0.192793 | -0.167 | 0.348334 |
| Midden 3 | 63 | 0.19 | -0.041 | 0.150026 | 0.023 | 0.119719 | -0.088 | 0.15383 |  |  | -0.027 | 0.19433 | -0.185 | 0.349187 |
| Midden 4 | 58 | 0.19 | -0.041 | 0.152699 | 0.023 | 0.123052 | -0.088 | 0.156437 |  |  | -0.027 | 0.1964 | -0.185 | 0.350343 |
| Midden 5 | 23 | 0.174 | -0.057 | 0.192689 | 0.007 | 0.170158 | -0.104 | 0.195665 |  |  | -0.043 | 0.228878 | -0.201 | 0.36953 |
| Midden 6 | 2 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| Midden 7 | 15 | 0.067 | -0.164 | 0.170684 | -0.1 | 0.144768 | -0.211 | 0.174036 |  |  | -0.15 | 0.210687 | -0.308 | 0.358548 |

| Area | Total N |  | Midden 1 |  | Midden 2 |  | Midden 3 |  | Midden 4 |  | Midden 5 |  | Midden 6 |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | Total N | 58 |  | 72 |  | 63 |  | 58 |  | 23 |  | 2 |  |
|  |  | Freq | 0.069 |  | 0.208 |  | 0.19 |  | 0.19 |  | 0.174 |  | 0 |  |
|  |  | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Midden 2 | 72 | 0.208 | 0.139 | 0.114212 |  |  |  |  |  |  |  |  |  |  |
| Midden 3 | 63 | 0.19 | 0.121 | 0.116787 | -0.018 | 0.134811 |  |  |  |  |  |  |  |  |
| Midden 4 | 58 | 0.19 | 0.121 | 0.120201 | -0.018 | 0.137779 | 0 | 0.139921 |  |  |  |  |  |  |
| Midden 5 | 23 | 0.174 | 0.105 | 0.168109 | -0.034 | 0.181095 | -0.016 | 0.182723 | -0.016 | 0.18493 |  |  |  |  |
| Midden 6 | 2 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| Midden 7 | 15 | 0.067 | -0.002 | 0.142353 | -0.141 | 0.157477 | -0.123 | 0.159355 | -0.123 | 0.161873 | -0.107 | 0.200038 | 0.067 | 0.126529 |

*Statistically significant differences are highlighted.

## Table 5: Brian Site Local Till Chert Differences by Area*

| Area | Total N | | Area 1 | | Area 2 | | Area 3 | | Area 4 | | Area 6 | | Area 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 52 | | 108 | | 54 | | 11 | | 23 | | 8 | |
| | | Freq | 0.654 | | 0.574 | | 0.444 | | 0.727 | | 0.739 | | 0.125 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 52 | 0.654 | | | | | | | | | | | | |
| Area 2 | 108 | 0.574 | -0.08 | 0.159421 | | | | | | | | | | |
| Area 3 | 54 | 0.444 | -0.21 | 0.185147 | -0.13 | 0.162049 | | | | | | | | |
| Area 4 | 11 | 0.727 | 0.073 | 0.293309 | 0.153 | 0.279305 | 0.283 | 0.294746 | | | | | | |
| Area 5 | 2 | 0 | | | | | | | | | | | | |
| Area 6 | 23 | 0.739 | 0.085 | 0.221208 | 0.165 | 0.202271 | 0.295 | 0.22311 | 0.012 | 0.318636 | | | | |
| Area 7 | 8 | 0.125 | -0.529 | 0.263133 | -0.449 | 0.247426 | -0.319 | 0.264734 | -0.602 | 0.349049 | -0.614 | 0.291097 | | |
| Midden 1 | 58 | 0.759 | 0.105 | 0.169802 | 0.185 | 0.144268 | 0.315 | 0.172272 | 0.032 | 0.285357 | 0.02 | 0.21055 | 0.634 | 0.254239 |
| Midden 2 | 72 | 0.583 | -0.071 | 0.172303 | 0.009 | 0.147204 | 0.139 | 0.174738 | -0.144 | 0.286853 | -0.156 | 0.212573 | 0.458 | 0.255916 |
| Midden 3 | 63 | 0.619 | -0.035 | 0.176347 | 0.045 | 0.151917 | 0.175 | 0.178726 | -0.108 | 0.2893 | -0.12 | 0.215863 | 0.494 | 0.258656 |
| Midden 4 | 58 | 0.69 | 0.036 | 0.17574 | 0.116 | 0.151213 | 0.246 | 0.178128 | -0.037 | 0.288931 | -0.049 | 0.215368 | 0.565 | 0.258243 |
| Midden 5 | 23 | 0.609 | -0.045 | 0.237675 | 0.035 | 0.220159 | 0.165 | 0.239446 | -0.118 | 0.330281 | -0.13 | 0.268306 | 0.484 | 0.303799 |
| Midden 6 | 2 | 0 | | | | | | | | | | | | |
| Midden 7 | 15 | 0.8 | 0.146 | 0.240196 | 0.226 | 0.222879 | 0.356 | 0.241949 | 0.073 | 0.3321 | 0.061 | 0.270542 | 0.675 | 0.305776 |

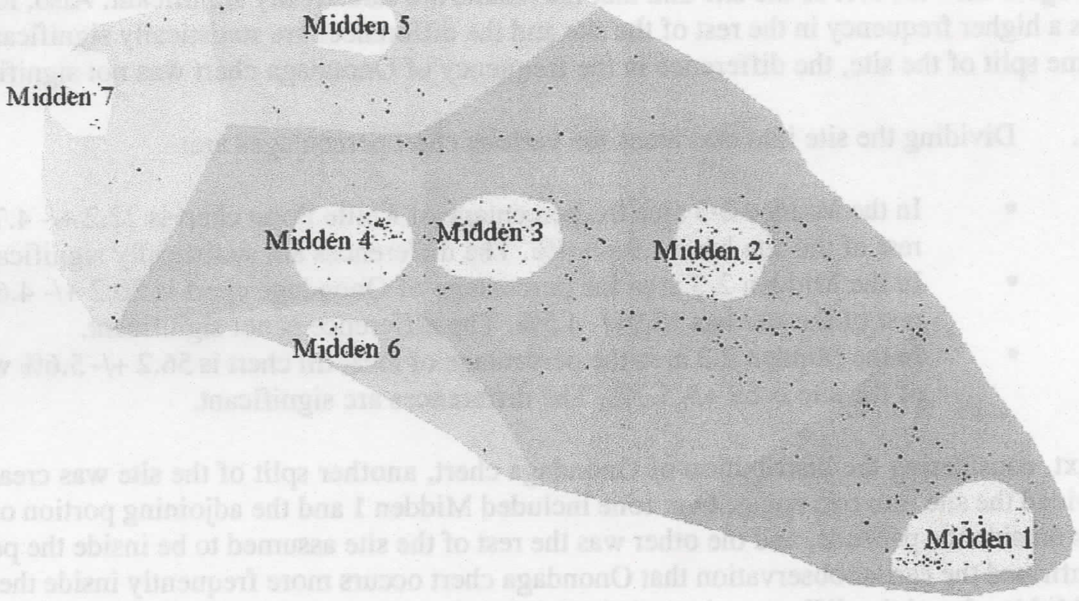
| Area | Total N | | Midden 1 | | Midden 2 | | Midden 3 | | Midden 4 | | Midden 5 | | Midden 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 58 | | 72 | | 63 | | 58 | | 23 | | 2 | |
| | | Freq | 0.759 | | 0.583 | | 0.619 | | 0.69 | | 0.609 | | 0 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Midden 1 | 58 | 0.759 | | | | | | | | | | | | |
| Midden 2 | 72 | 0.583 | -0.176 | 0.158388 | | | | | | | | | | |
| Midden 3 | 63 | 0.619 | -0.14 | 0.162777 | 0.036 | 0.165385 | | | | | | | | |
| Midden 4 | 58 | 0.69 | -0.069 | 0.162121 | 0.107 | 0.164739 | 0.071 | 0.168963 | | | | | | |
| Midden 5 | 23 | 0.609 | -0.15 | 0.227789 | 0.026 | 0.229659 | -0.01 | 0.232708 | -0.081 | 0.232249 | | | | |
| Midden 6 | 2 | 0 | | | | | | | | | | | | |
| Midden 7 | 15 | 0.8 | 0.041 | 0.230418 | 0.217 | 0.232268 | 0.181 | 0.235283 | 0.11 | 0.234829 | 0.191 | 0.284164 | 0.8 | 0.202428 |

*Statistically significant differences are highlighted.

3. With respect to Onondaga chert, Midden 1 has a lower frequency than the adjacent Area 1 as well as Area 2 and 3 and their middens (Table 4). Midden 1 is outside the palisade. Within the palisade Areas 1, 2 and 3 have higher frequencies but the differences to the rest of the interior are not significant.
4. The highest concentrations of Kettle Point chert are in Areas 2 and 3 and their associated middens. The areas they differ from significantly are Areas 1 and 6 (Table 3).
5. In general, local till chert has high frequencies over most of the site with the exception of Area 7 (Table 5) which had a very low frequency. Unfortunately, this area has few flakes but even with a small sample the difference to the entire rest of the site is significant.
6. As to the internal distribution of local till chert, excluding Area 7 there are two other sets of areas which differ significantly from each other. Area 2 and 3 and Midden 2 have a lower frequency than Areas 1 and 6 and Middens 1, 2, 4 and 7 (Table 5).

Figure 2: Brian Site

Cultural Areas



Flake Type Observations

In general, there is much less variation in flake types over the surface of the site than there is for chert source types. There are only a few significant differences and these involve one area of the site being different from some others. Following are the notable differences:

7. Looking at the flake types, both bifacial retouch flakes and shatter showed no significant differential distributions over the site (Table 2).

8. With regard to decortication flakes, Midden 1 has a frequency that is significantly lower than Midden 4 and Area 6.
9. Flake fragments are lower in Midden 3 than the immediately adjacent Area 3.
10. For core trimming flakes, Midden 2 has significantly lower frequencies than Areas 1 and 3 and Midden 4.

General Comments

In considering the distribution of chert types in general, examining all of the observations for chert source type, a number of generalizations can be made. The first point is that the western portions of the site have lower densities of detritus and therefore, do not show up as statistically significant for a number of categories. This region includes areas 4, 5, and 7 in particular. Second, it is clear that Kettle Point chert occurs with a higher frequency in Areas 2 and 3 and their middens. Third, on the other hand, Onondaga chert seems to be evenly distributed except that it tends to not occur in Midden 1 outside the palisade. And fourth, in some of the other areas of the site the lack of Kettle Point chert seems to be compensated for by increased use of local till chert.

In order to look closer at these generalizations, a further analysis was done where the site was divided into two regions, one a combination of Middens 2 and 3 and their associated areas and the other with everything else. This analysis clearly indicated that the frequency of Kettle Point chert in these areas is higher than the rest of the site and that the results are statistically significant. Also, local till chert has a higher frequency in the rest of the site and the differences are statistically significant. Using the same split of the site, the difference in the frequency of Onondaga chert was not significant.

11. Dividing the site into two areas the various chert percentages are:

- In the Midden 2-3 area the percentage of Kettle Point chert is 22.2 +/- 4.7% while the rest of the site has 11.9 +/- 4%. The differences are statistically significant
- In the Midden 2-3 area the percentage of Onondaga chert is 20.2 +/- 4.6% while the rest of the site has 15.9+/- 4.5%. The difference is not significant.
- In the Midden 2-3 area the percentage of local till chert is 56.2 +/- 5.6% while the rest of the site is 69 +/- 5.7%. The differences are significant.

Next, considering the distribution of Onondaga chert, another split of the site was created that also divided the site into two zones. One zone included Midden 1 and the adjoining portion of Area 1 that lies outside the palisade, and the other was the rest of the site assumed to be inside the palisade. This confirmed the earlier observation that Onondaga chert occurs more frequently inside the village than in Midden 1 and the difference is statistically significant.

While that completes the chert source analysis that is statistically significant, mention should be made of Area 7 since the various frequencies are distinctly different from the rest of the site. Unfortunately, the sample is low so there are no statistically significant differences excepting that local till chert is very low compared to the rest of the site. The flakes in this area are the higher quality Kettle Point, Onondaga and other chert. Also, looking at the flake types, most of these are either bifacial retouch (25%) or fragmentary flakes (50%), both of which are suggestive of late stage reduction. While the differences are not significant, it is suggestive that the knapping activity taking place in Area 7 was different than the rest of the site.

Another area of the site that is unique is Midden 1. During excavation for the UWO field school (Ellis 1996), it was determined that this midden was outside the palisade. As noted above, the midden has a lower frequency of Onondaga chert. Looking at the flake types we also note that there is a lower frequency of decortication flakes than that found elsewhere in the village. This result is especially puzzling as the midden also has a high frequency of local till chert and in general local till chert has a higher percentage of decortication flakes than do the other chert source types over the site. This evidence suggests that the reduction and use cycle leading to deposition of debitage in Midden 1 was different than that for the other middens in the site. Furthermore, while the CSP shows a frequency for Kettle Point chert in the 10% range, personal observation of flake samples from the midden excavation indicate that the actual frequency is much lower than that. However, to support this observation would require a detailed analysis of the debitage.

In considering the flake types, the purpose of the spatial analysis is to understand the general pattern of the reduction sequence in the village. As noted above in the observations, the differences in the frequencies of the various flake types between the various areas is weak. Two types, bifacial retouch flakes and shatter, show no significant differences between the site areas and another, decortication flakes has been discussed above for Midden 1. In looking at flake fragments and core trimming flakes, Area 3 shows differences in both types. As noted above, Area 3 appears to be higher than the rest of the site in both Kettle Point chert (24.1%) and Onondaga chert (27.8%). Taken together this would suggest that the reduction activities taking place in Area 3 and the associated midden were different than that for the rest of the site. The residents had better access to higher quality chert and the reduction processes were different.

## CASSANDRA SITE ANALYSIS

The Cassandra site is a small late prehistoric LOI village or hamlet located just north of Lambeth on a small creek. A CSP was conducted by the author in 1998 (Keron 2000) that clearly identified the site boundaries and three middens within the site. As there are clearly defined middens, the cultural areas defined for the site were based on these three middens and as before, the rest of the site was divided into three other areas based on proximity to the nearest midden. The cultural areas are identified in Figure 3. The data used to develop this analysis are presented in Tables 6 through 8.

### Chert Source Type Analysis

The initial analysis was conducted to examine the distribution of unidentifiable chert yielding the following observation:

1. There is no statistically significant spatial patterning of unidentifiable chert.

The next spatial analysis was conducted on Kettle Point chert, Onondaga chert and local till chert as measured against the six cultural areas. The analysis was not attempted on "other" chert as the numbers were too small. The following are the observations:

2. The difference in percentages of local till chert between Midden 2 and Midden 3 is different with statistical significance.
3. Kettle Point chert is the most commonly used chert, forming over half the sample in each area (Table 6). The frequencies across the site are similar in the 50-60% range.

4. Midden 3 has the highest percentage of Onondaga chert but the differences from other areas are not quite statistically significant (Table 6).
5. Middens 1 and 2 do not have the same access to Onondaga and compensate with increased use of local till chert (Table 6).

**Table 6: Cassandra Site Chert Source Percentages by Area**

| Area | Total n | Kettle Point Chert | | Onondaga Chert | | Local Till Chert | | UID Chert | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | Total n | % | SE |
| Area 1 | 6 | 50 | 40 | 16.7 | 29.8 | 16.7 | 29.8 | 9 | 33.3 | 30.8 |
| Area 2 | 5 | 20 | 35.1 | 40 | 42.9 | 40 | 42.9 | 6 | 16.7 | 29.8 |
| Area 3 | 4 | 25 | 42.4 | 50 | 49 | 25 | 42.4 | 4 | | |
| Midden 1 | 47 | 53.2 | 14.3 | 17 | 10.7 | 29.8 | 13.1 | 57 | 17.5 | 9.9 |
| Midden 2 | 33 | 60.6 | 16.7 | 18.2 | 13.2 | 21.2 | 13.9 | 36 | 8.3 | 9 |
| Midden 3 | 19 | 57.9 | 22.2 | 36.8 | 21.7 | 5.3 | 10 | 27 | 29.6 | 17.2 |

Given the distribution of patterning of Onondaga and local till chert, a second round of analysis was conducted where the number of areas was collapsed from six to three by combining the associated middens and areas. The analysis in this manner yielded the following observations.

6. The differences between Area 2 and Area 3 are significant for local till chert.
7. The differences between the same areas for Onondaga are significant at about the 90% (rather than the normally used 95%) level.

Flake Type Analysis

The analysis of the distribution of the various flake types was conducted with both the six areas and the three areas with the following result.

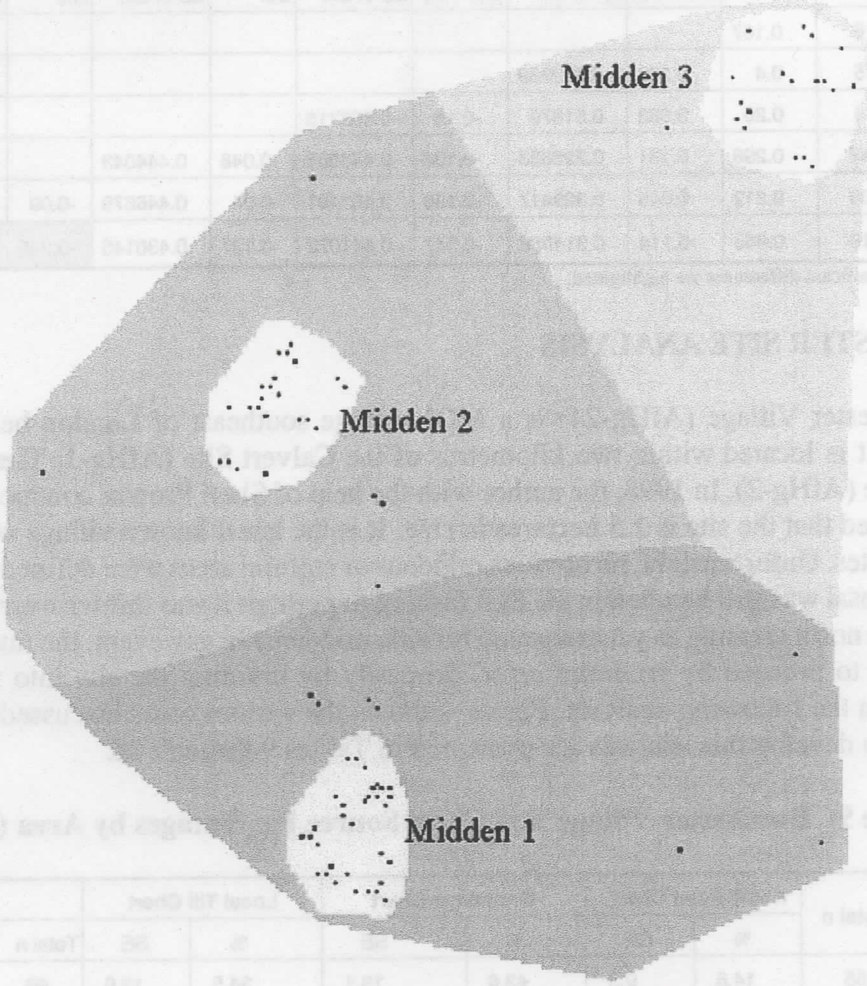
8. None of the flake types have any significant distribution. Midden 2 has a higher frequency of core trimming flakes but the difference is not significant.

**Table 7: Cassandra Site Flake Type Percentages by Area**

| Area | Total n | Decortication | | Core Trimming | | Bifacial Retouch | | Shatter | | Fragment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | % | SE | % | SE |
| Area 1 | 9 | 11.1 | 20.5 | 22.2 | 27.2 | 11.1 | 20.5 | | | 55.6 | 32.5 |
| Area 2 | 6 | 33.3 | 37.7 | 16.7 | 30.8 | | | | | 50 | 40 |
| Area 3 | 4 | | | 25 | 42.4 | 25 | 42.4 | 25 | 42.4 | 25 | 42.4 |
| Midden 1 | 58 | 10.3 | 7.8 | 36.2 | 12.4 | 13.8 | 8.9 | 5.2 | 5.7 | 34.5 | 12.2 |
| Midden 2 | 35 | 20 | 13.3 | 20 | 13.3 | 14.3 | 11.6 | 8.6 | 9.3 | 37.1 | 16 |
| Midden 3 | 26 | 11.5 | 12.3 | 30.8 | 17.7 | 15.4 | 13.9 | 11.5 | 12.3 | 30.8 | 17.7 |

Figure 3: Cassandra Site

Cultural Areas



### General Comments

In general at the Cassandra site, the most commonly used chert is Kettle Point chert and all areas of the site have equal access to it. One area around Midden 3 has preferred access to Onondaga and the rest of the site does not have the same access to this chert. The rest of the site compensates for this lack by use of local till chert. All reduction activities take place throughout the entire site.

### Table 8: Cassandra Site Local Till Chert Differences by Area*

| Area | | | Area 1 | | Area 2 | | Area 3 | | Midden 1 | | Midden 2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total N | | 6 | | 5 | | 4 | | 47 | | 33 | |
| | Freq | | 0.167 | | 0.4 | | 0.25 | | 0.298 | | 0.212 | |
| | Total N | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff | SE of Diff | Diff | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 6 | 0.167 | | | | | | | | | | |
| Area 2 | 5 | 0.4 | 0.233 | 0.522939 | | | | | | | | |
| Area 3 | 4 | 0.25 | 0.083 | 0.51879 | -0.15 | 0.603715 | | | | | | |
| Midden 1 | 47 | 0.298 | 0.131 | 0.325833 | -0.102 | 0.448883 | 0.048 | 0.444043 | | | | |
| Midden 2 | 33 | 0.212 | 0.045 | 0.329417 | -0.188 | 0.451491 | -0.04 | 0.446679 | -0.09 | 0.191171 | | |
| Midden 3 | 19 | 0.053 | -0.114 | 0.314986 | -0.347 | 0.441072 | -0.197 | 0.436145 | -0.245 | 0.165067 | -0.159 | 0.172033 |

*Statistically significant differences are highlighted.

## DORCHESTER SITE ANALYSIS

The Dorchester Village (AfHg-24) is a MOI village southeast of London belonging to the Uren Substage. It is located within two kilometres of the Calvert Site (AfHg-1; Timmins 1997) and the Mustos Site (AfHg-2). In 1998, the author with the help of Shari Prowse conducted a CSP on the site that indicated that the site is 1.5 hectares in size. It is the latest known village within the Dorchester cluster of sites. Unfortunately, no obvious middens or cultural areas were defined by the CSP. Perhaps refuse disposal was still handled in the EOI fashion or perhaps it was thrown over the edge of the steep slope to the north creating as yet unlocated hillside middens. In any event, the interior spatial analysis was forced to proceed by trial and error, primarily by dividing the site into thirds and halves as described in the following analysis. Figure 4 shows the various areas discussed in the analysis. The data used to develop this analysis are presented in Tables 9 through 12.

### Table 9: Dorchester Village Site Chert Source Percentages by Area (Three Areas)

| Area | Total n | Kettle Point Chert | | Onondaga Chert | | Local Till Chert | | UID Chert | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | Total n | % | SE |
| West | 55 | 14.5 | 9.3 | 43.6 | 13.1 | 34.5 | 12.6 | 69 | 20.3 | 9.5 |
| Central | 59 | 5.1 | 5.6 | 59.3 | 12.5 | 28.8 | 11.6 | 68 | 13.2 | 8.1 |
| East | 44 | 4.5 | 4.5 | 59.1 | 14.5 | 29.5 | 13.5 | 58 | 24.1 | 11 |

### Chert Source Type Analysis

In lieu of any visible middens around which to define cultural areas, the first round of the analysis was done using the three arbitrarily defined areas shown in Figure 4. While this is certainly much less

### Table 10: Dorchester Village Site Chert Source Percentages by Area (KP Area vs the Rest)

| Area | Total n | Kettle Point Chert | | Onondaga Chert | | Local Till Chert | |
|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE |
| KP Area | 19 | 31.6 | 20.9 | 31.6 | 20.9 | 31.6 | 20.9 |
| The Rest | 140 | 5 | 3.6 | 57.1 | 8.2 | 30.7 | 7.6 |

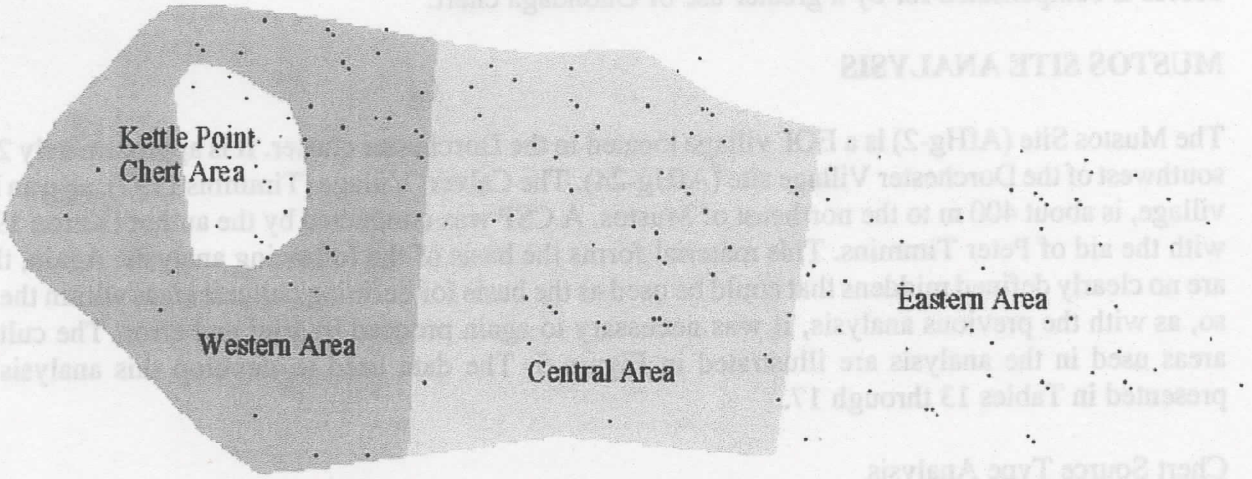
than desirable, an approach like this would have eventually discovered the major trends in Brian and Cassandra. The observations are as follows.

1. Local till chert is evenly distributed over the site (Table 9).
2. Onondaga and Kettle Point cherts are evenly distributed in the central and eastern areas (Table 9).
3. In the western area, Kettle Point chert occurs with a higher frequency and the frequency of Onondaga chert is less frequent.
4. None of these trends is statistically significant.

A second analysis was run where the central and eastern areas were combined and compared to the western area. However, while the same trends were apparent, none were statistically significant. The map of the distribution of Kettle Point chert was then examined and there appeared to be some patterning to it. First, there was a background distribution of Kettle Point chert over the site that was fairly even. However, there was one spot where half of the Kettle Point chert flakes grouped together in a fairly tight cluster. Accordingly, this area was circled and another two-area map produced that contained the cluster in one area and everything else in the other. This definition of cultural areas was then run through the analysis with the following results:

5. Local Till chert is identical between the two areas.
6. In the small area to the west, the frequency of Kettle Point chert is much higher than the rest of the site, 31.6% versus 5% (Table 10).
7. Onondaga is significantly lower in that same area with statistical significance (Table 10).

Figure 4: Dorchester Village
Cultural Areas



Flake Type Analysis

The flake types analysis was run through several different site areas.

8. There were no statistically significant differences in the distribution of the various flake types.

**Table 11: Dorchester Village Flake Type Percentages by Area**

| Area | Total n | Decortication | | Core Trimming | | Bifacial Retouch | | Shatter | | Fragment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | % | SE | % | SE |
| West | 68 | 22.1 | 9.9 | 33.8 | 11.2 | 10.3 | 7.2 | 5.9 | 5.6 | 27.9 | 10.7 |
| Central | 67 | 16.4 | 8.9 | 32.8 | 11.2 | 19.4 | 9.5 | 4.5 | 5 | 26.9 | 10.6 |
| East | 56 | 14.3 | 9.2 | 28.6 | 11.8 | 17.9 | 10 | 14.3 | 9.2 | 25 | 11.3 |

General Comments

The patterning within the Dorchester Village site is similar to that observed for the earlier discussed sites with the exception that the various chert types have reversed their position. The chert type that is evenly distributed is local till chert. There is differential but restricted access to Kettle Point chert within one small zone of the site. In the other zones where access to Kettle Point chert is severely restricted, lack of access is compensated for by a greater use of Onondaga chert.

**Table 12: Dorchester Village Site Local Till Chert Differences by Area (KP Area vs the Rest)***

| | | | KP Area | |
|---|---|---|---|---|
| | | Total N | 19 | |
| | | Freq | 0.316 | |
| Area | Total N | Freq | Diff Freq | SE of Diff |
| KP Area | 19 | 0.316 | | |
| The Rest | 140 | 0.05 | -0.266 | 0.212145 |

*Statistcally significant differences are highlighted

## MUSTOS SITE ANALYSIS

The Mustos Site (AfHg-2) is a EOI village located in the Dorchester cluster. It is approximately 2 km southwest of the Dorchester Village site (AfHg-24). The Calvert Village (Timmins 1997), also an EOI village, is about 400 m to the northeast of Mustos. A CSP was conducted by the author (Keron 1986) with the aid of Peter Timmins. This material forms the basis of the following analysis. Again, there are no clearly defined middens that could be used as the basis for defining cultural areas within the site so, as with the previous analysis, it was necessary to again proceed by trial and error. The cultural areas used in the analysis are illustrated in Figure 5. The data used to develop this analysis are presented in Tables 13 through 17.

Chert Source Type Analysis

1. Using the east-west division of the site there are no differences that are significant (Table 13).
2. Using a north-south division, Kettle Point chert frequency is higher in the middle band and lower in the south band. Local till chert is the reverse but the differences are not significant

(Table 16).

3. There is no Kettle Point chert in the little cluster to the north (Table 16).

Flake Type Analysis

4. Using the east-west division, shatter is more apt to be found in the eastern side of the site (17.2% versus 6.3%) (Table 14).
5. Bifacial retouch flakes are more apt to be found on the western side of the site but the differences are not significant (Table 14).
6. Using the north-south division, bifacial retouch flakes are more apt to be found in the middle section of the site than in the southern section (10.7% vs 2.7%) but the difference is not statistically significant (Table 17).

**Table 13: Mustos Site Chert Source Percentages by Area (East-West Split)**

| Area | Total n | Kettle Point Chert | | Onondaga Chert | | Local Till Chert | | UID Chert | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | Total n | % | |
| East | 89 | 21.3 | 8.5 | 27 | 14.3 | 39.3 | 10.1 | 117 | 23.9 | 7.7 |
| West | 37 | 32.4 | 15.1 | 33.7 | 9.8 | 40.5 | 15.8 | 51 | 27.5 | 12.2 |

**Table 14: Mustos Flake Type Percentages by Area (East-West Split)**

| Area | Total n | Decortication | | Core Trimming | | Bifacial Retouch | | Shatter | | Fragment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | % | SE | % | SE |
| East | 48 | 10.4 | 8.6 | 33.6 | 8.6 | 12.5 | 9.4 | 6.3 | 6.8 | 31.3 | 13.1 |
| West | 116 | 11.2 | 5.7 | 39.6 | 13.8 | 4.3 | 3.7 | 17.2 | 6.9 | 33.5 | 8.6 |

General Comments

Despite trying several divisions of the site there do not appear to be any significant differences in the distribution of chert source types over the site. Looking at the debitage types there is a tendency for shatter to occur towards the southeast corner of the site. This last trend is especially puzzling since, in theory, shatter and decortication flakes should tend to co-vary especially where local till chert is involved. Unfortunately, with the Mustos sample, much of the shatter is unidentifiable as to source. The local till chert debitage that was either shatter or decortication was plotted but this did not follow the same clustering to the southeast pattern.

**Table 15: Mustos Site Debitage Differences by Area (East-West Split) - Shatter***

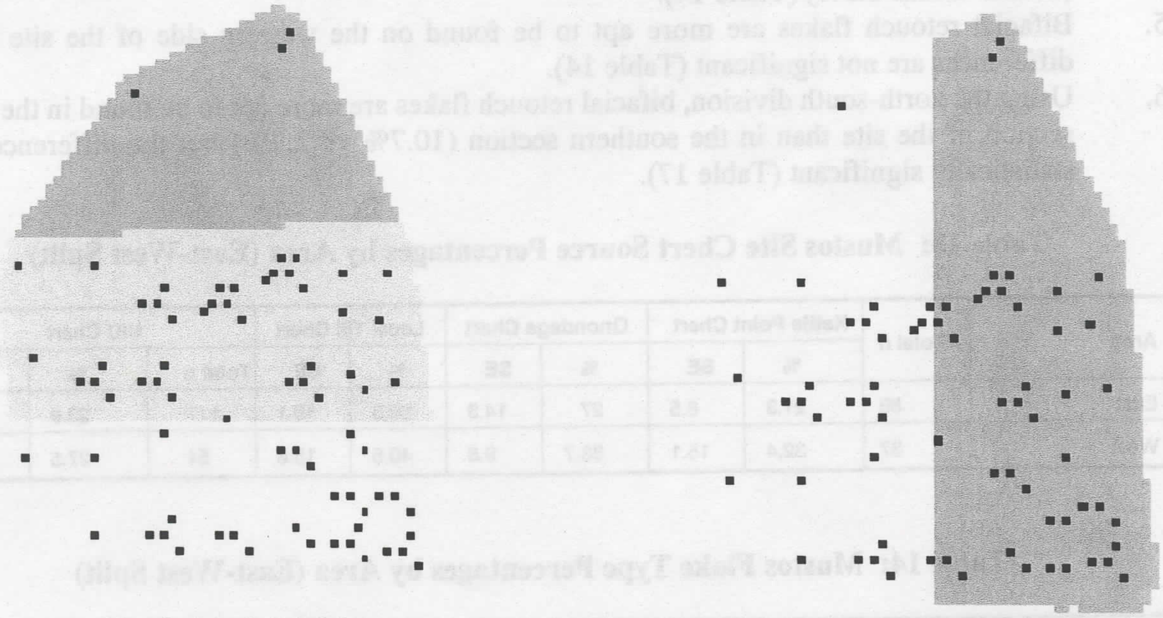
| Area | Total N | East | | |
|---|---|---|---|---|
| | | Total N | 116 | |
| | | Freq | 0.172 | |
| | | Freq | Diff Freq | SE of Diff |
| East | 116 | 0.172 | | |
| West | 48 | 0.063 | -0.109 | 0.097164 |

*Statistically significant differences are highlighted.

In both the east-west and north-south analysis there was some patterning of bifacial retouch flakes. In fact, looking at their distribution there appears to be two loci where they are located, one in the west central portion of the site and another represented by two flakes in the southeast corner.

# Figure 5 : Mustos Site

## Cultural Areas



North-South Division

East-West Division

### Table 16: Mustos Site Chert Source Percentages by Area (North-South Split)

| Area | Total n | Kettle Point Chert | | Onondaga Chert | | Local Till Chert | | UID Chert | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | Total n | % | SE |
| North | 3 | 0 | | 66.7 | 53.3 | 33.3 | 53.3 | 5 | 40 | 42.9 |
| Central | 68 | 30.9 | 11 | 27.9 | 10.7 | 35.3 | 11.4 | 86 | 20.9 | 8.6 |
| South | 55 | 18.2 | 10.2 | 34.5 | 12.6 | 45.5 | 13.2 | 77 | 28.6 | 10.1 |

### Table 17: Mustos Flake Type Percentages by Area (North-South Split)

| Area | Total n | Decortication | | Core Trimming | | Bifacial Retouch | | Shatter | | Fragment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | % | SE | % | SE |
| North | 5 | 20 | 35.1 | 60 | 42.9 | 0 | | 0 | | 20 | 35.1 |
| Central | 84 | 9.5 | 6.3 | 38.1 | 10.4 | 10.7 | 6.6 | 11.9 | 6.9 | 29.8 | 9.8 |
| South | 75 | 12 | 7.4 | 30.7 | 10.4 | 2.7 | 3.6 | 17.3 | 8.6 | 37.3 | 10.9 |

**Table 18: Mustos Site Debitage Differences by Area (North-South Split) - Bifacial Retouch Flakes***

| Area | Total N | | North | | Central | |
|---|---|---|---|---|---|---|
| | | Total N | 5 | | 84 | |
| | | Freq | 0 | | 0.107 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| North | 5 | 0 | | | | |
| Central | 84 | 0.107 | 0.107 | 0.066105 | | |
| South | 75 | 0.027 | 0.027 | 0.036683 | -0.08 | 0.0756 |

*Statistically significant differences are highlighted.

## DRUMHOLM SITE ANALYSIS

The Drumholm site is a large Middleport Substage village located west of London on Oxbow Creek. It has been investigated several times by Robert Pearce (1996) and is known entirely through surface collection. Pearce identified eleven middens on the site in his thesis and conducted a CSP on the site in 1994. This CSP includes the entire site area. At earlier times, material was recovered and was cataloged by midden number. This material was added to the CSP for the purposes of this analysis. This procedure has one unfortunate drawback in that the samples from the non-midden areas are too small for statistical analysis. Consequently, the areas around Middens 3, 10, 5, 7, 8, and 11 had to be ignored. Further the samples from Middens 3, 8 and 10 were also too small. Samples from Areas 1, 6 and 9 and Midden 11 were also small but have been included in the discussion. Figure 6 shows the defined cultural areas. The data giving rise to these observations can be found in Tables 19 through 23.

Chert Type Observations

In considering the distribution of burned or unidentifiable chert, the percentage of burned chert on the site does vary between areas. In looking at the midden areas, the amount of burned chert varies from 3.7 % to 43%, a much wider variation than that observed for the Brian Site. The statistically significant difference is as follows:

1. Middens 1 and 2 have a higher percentage of burned chert than Middens 4,5 and 6.

Analysis of the distribution of the various chert types against the cultural areas yields the following observations:

2. Area 6 and Middens 5, 6 and 7 have low values for Kettle Point chert while Middens 1, 2, 4 and 9 have percentages of Kettle Point chert that are higher with statistical significance (Table 21).
3. Areas 2 and 4 have higher percentage of Kettle Point chert than Middens 6 and 7 with statistical significance (Table 21).
4. Areas 1 and 9 have high percentages of Kettle Point chert but the samples from both areas are small (Table 19).
5. Middens 5, 6 and 7 and Area 6 have higher percentages of Onondaga chert than Middens 1, 2, 4 and 9 and Area 2 with statistical significance (Table 22).
6. Areas 1 and 9 have no Onondaga chert but the samples are small (Table 19).
7. Area 4 is an anomaly. It ranked in the group of areas that have high Kettle Point chert but it also has a high percentage of Onondaga chert. It has a higher percentage of Onondaga than Middens 1, 2, 4,and 9 and Area 2 with statistical significance (Table 22).

8. Area 4 and Midden 7 have lower percentages of local till chert than many other areas with statistical significance (Table 23).

### Table 19: Drumholm Site Chert Source Percentages by Area

| Area | Total n | Kettle Point Chert | | Onondaga Chert | | Local Till Chert | | | UID Chert | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | Total n | % | SE |
| Midden 1 | 12 | 58.3 | 27.9 | 8.3 | 15.6 | 33.3 | 26.7 | 21 | 42.9 | 21.2 |
| Area 1 | 5 | 60 | 42.3 | 0 | | 40 | 42.9 | 6 | 16.7 | 29.8 |
| Midden 2 | 54 | 35.2 | 12.7 | 25.9 | 11.7 | 37 | 12.9 | 90 | 40 | 10.1 |
| Area 2 | 11 | 36.4 | 28.4 | 9.1 | 17 | 54.5 | 29.4 | 14 | 21.4 | 21.5 |
| Midden 4 | 14 | 42.9 | 25.9 | 7.1 | 13.5 | 50 | 26.2 | 17 | 17.6 | 18.1 |
| Area 4 | 17 | 29.4 | 21.7 | 52.9 | 23.7 | 17.6 | 18.1 | 21 | 19 | 16.8 |
| Midden 5 | 23 | 8.7 | 11.5 | 65.2 | 19.5 | 26.1 | 17.9 | 25 | 8 | 10.6 |
| Midden 6 | 26 | 3.8 | 7.4 | 50 | 19.2 | 46.2 | 19.2 | 27 | 3.7 | 7.1 |
| Area 6 | 10 | 10 | 18.6 | 60 | 30.4 | 30 | 28.4 | 14 | 28.6 | 23.7 |
| Midden 7 | 18 | 0 | 0 | 83.3 | 17.2 | 16.7 | 17.2 | 20 | 10 | 13.1 |
| Midden 9 | 18 | 38.9 | 22.5 | 16.7 | 17.2 | 38.9 | 22.5 | 23 | 21.7 | 16.9 |
| Area 9 | 5 | 80 | 35.1 | 0 | | 0 | | 6 | 16.7 | 29.8 |
| Midden 11 | 7 | 14.3 | 25.9 | 42.9 | 36.7 | 42.9 | 36.7 | 7 | 0 | |

## Flake Type Analysis

An analysis was run examining at the distribution of the various flake types against the cultural areas with the following result:

9. There are no statistically significant differences across any of the cultural areas.

## General Comments

In considering the observations on the Drumholm site, it is evident that differences between the same groups of areas can be found in both the analysis of the distribution of Kettle Point chert and Onondaga chert. Area 6 and Middens 5, 6 and 7 are different from Middens 1, 2, 4, and 9. In addition, Areas 1, 2 and 9 are high in Kettle Point and low in Onondaga. In examining these trends as a whole, it became obvious that the areas with high Kettle Point and low Onondaga chert were to the north while the areas with the reverse were to the south. Consequently, a new definition of cultural areas that split the site into two halves, north and south, was developed. Middens 1, 2, 3, 10, and 11 and their associated areas are in the north unit. Middens 5, 7 and 8 and their associated areas are in the south unit. Middens 4, 6 and 9 and their associated areas have been divided between the two units. The boundary between these two units is marked on Figure 6. All of the following differences are statistically significant.

## Table 20: Drumholm Site Flake Type Percentages by Area

| Area | Total n | Decortication | | Core Trimming | | Bifacial Retouch | | Shatter | | Fragment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | SE | % | SE | % | SE | % | SE | % | SE |
| Midden 1 | 21 | 14.3 | 15 | 38.1 | 20.8 | 23.8 | 18.2 | 0 | | 23.8 | 18.2 |
| Area 1 | 6 | 50 | 40 | 16.7 | 29.8 | 0 | | 0 | | 33.3 | 37.7 |
| Midden 2 | 91 | 13.2 | 7 | 42.9 | 10.2 | 12.1 | 6.7 | 8.8 | 5.8 | 23.1 | 8.7 |
| Area 2 | 14 | 14.3 | 18.3 | 42.9 | 25.9 | 7.1 | 13.5 | 14.3 | 18.3 | 21.4 | 21.5 |
| Midden 4 | 17 | 5.9 | 11.2 | 47.1 | 23.7 | 29.4 | 21.7 | 0 | | 17.6 | 18.1 |
| Area 4 | 21 | 4.8 | 9.1 | 38.1 | 20.8 | 19 | 16.8 | 9.5 | 12.6 | 28.6 | 19.3 |
| Midden 5 | 25 | 8 | 10.6 | 28.6 | 33.5 | 12 | 12.7 | 0 | | 52 | 19.6 |
| Midden 6 | 26 | 3.8 | 7.4 | 46.2 | 19.2 | 11.5 | 12.3 | 3.8 | 7.4 | 34.6 | 18.3 |
| Area 6 | 15 | 0 | | 40 | 24.8 | 6.7 | 12.6 | 6.7 | 12.6 | 46.7 | 25.2 |
| Midden 7 | 20 | 5 | 9.6 | 45 | 21.8 | 0 | | 15 | 15.6 | 35 | 20.9 |
| Midden 9 | 23 | 13 | 13.8 | 34.8 | 19.5 | 17.4 | 15.5 | 13 | 13.8 | 21.7 | 16.9 |
| Area 9 | 6 | 0 | | 0 | | 33.3 | 37.7 | 0 | | 66.7 | 37.7 |
| Midden 11 | 7 | 57.1 | 36.7 | 28.6 | 33.5 | 14.3 | 25.9 | 0 | | 0 | |

10. When the spatial analysis was run the following confidence intervals result:

- Kettle Point chert was 38.7 +/- 8.2% in the north and 9.1 +/- 5.7% in the south half.
- Onondaga chert was 19 +/- 6.6% in the north and 64.3 +/- 9.4% in the south half.
- Local Till chert was 40.9 +/- 8.2% in the north and 25.3 +/- 8.6% in the south half.

Clearly the north half of the site had more use of Kettle Point chert than did the south half and the south half had better access to Onondaga chert than did the north half. Again it appears that a shortfall in access to high quality chert was compensated for with greater use of local till chert in both areas of the site.

One area of the site that does not fit this generalization well is the area around Midden 4. This area is high in both Onondaga and Kettle Point chert (and consequently very low for local till chert). This area may represent a special zone within the site that was used preferentially for high quality chert working but it should also be noted that this area was split to create the north/south site division just described. In fact, Onondaga chert tends occur in the south half of the area while Kettle Point tends to be found more in the north half. However, neither of these distributions is statistically significant. While it might be unwise to assign any special significance to Area 4 without more evidence, it should be noted that a similar area was found at the Brian site above and it was near the centre of the site.

# Table 21: Drumholm Site Kettle Point Chert Differences*

| Area | Total N | | Area 1 | | Area 2 | | Area 4 | | Area 6 | | Area 9 | | Midden 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 5 | | 11 | | 17 | | 10 | | 5 | | 12 | |
| | | Freq | 0.6 | | 0.364 | | 0.294 | | 0.1 | | 0.8 | | 0.582 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 5 | 0.6 | | | | | | | | | | | | |
| Area 2 | 11 | 0.364 | -0.236 | 0.515021 | | | | | | | | | | |
| Area 4 | 17 | 0.294 | -0.306 | 0.480938 | -0.07 | 0.357427 | | | | | | | | |
| Area 6 | 10 | 0.1 | -0.5 | 0.467944 | -0.264 | 0.339741 | -0.194 | 0.285445 | | | | | | |
| Area 9 | 5 | 0.8 | 0.2 | 0.554372 | 0.436 | 0.451421 | 0.506 | 0.412111 | 0.7 | 0.39687 | | | | |
| Midden 1 | 12 | 0.582 | -0.018 | 0.51213 | 0.218 | 0.39841 | 0.288 | 0.35325 | 0.482 | 0.335343 | -0.218 | 0.44812 | | |
| Midden 2 | 54 | 0.352 | -0.248 | 0.44791 | -0.012 | 0.311571 | 0.058 | 0.25126 | 0.252 | 0.225391 | -0.448 | 0.373039 | -0.23 | 0.30677 |
| Midden 4 | 14 | 0.429 | -0.171 | 0.501611 | 0.065 | 0.384794 | 0.135 | 0.337818 | 0.329 | 0.319047 | -0.371 | 0.43606 | -0.153 | 0.380917 |
| Midden 5 | 23 | 0.087 | -0.513 | 0.444594 | -0.277 | 0.306784 | -0.207 | 0.245299 | -0.013 | 0.218727 | -0.713 | 0.36905 | -0.495 | 0.301907 |
| Midden 6 | 26 | 0.038 | -0.562 | 0.435658 | -0.326 | 0.293685 | -0.256 | 0.228705 | -0.062 | 0.199939 | -0.762 | 0.358235 | -0.544 | 0.288586 |
| Midden 7 | 18 | 0 | -0.6 | 0.429414 | -0.364 | 0.284341 | -0.294 | 0.216575 | -0.1 | 0.185942 | -0.8 | 0.350615 | -0.582 | 0.279071 |
| Midden 9 | 18 | 0.389 | -0.211 | 0.484895 | 0.025 | 0.362734 | 0.095 | 0.312459 | 0.289 | 0.292062 | -0.411 | 0.416722 | -0.193 | 0.358618 |
| Midden 11 | 7 | 0.143 | -0.457 | 0.50165 | -0.221 | 0.384845 | -0.151 | 0.337877 | 0.043 | 0.319109 | -0.657 | 0.436105 | -0.439 | 0.380968 |

| Area | Total N | | Midden 2 | | Midden 4 | | Midden 5 | | Midden 6 | | Midden 7 | | Midden 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 54 | | 14 | | 23 | | 26 | | 18 | | 18 | |
| | | Freq | 0.352 | | 0.429 | | 0.087 | | 0.038 | | 0 | | 0.389 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Midden 4 | 14 | 0.429 | 0.077 | 0.288866 | | | | | | | | | | |
| Midden 5 | 23 | 0.087 | -0.265 | 0.171738 | -0.342 | 0.283697 | | | | | | | | |
| Midden 6 | 26 | 0.038 | -0.314 | 0.147065 | -0.391 | 0.269477 | -0.049 | 0.136632 | | | | | | |
| Midden 7 | 18 | 0 | -0.352 | 0.127385 | -0.429 | 0.259262 | -0.087 | 0.115183 | -0.038 | 0.073493 | | | | |
| Midden 9 | 18 | 0.389 | 0.037 | 0.258753 | -0.04 | 0.343428 | 0.302 | 0.252968 | 0.351 | 0.236912 | 0.389 | 0.225224 | | |
| Midden 11 | 7 | 0.143 | -0.209 | 0.288934 | -0.286 | 0.366705 | 0.056 | 0.283766 | 0.105 | 0.26955 | 0.143 | 0.259338 | -0.246 | 0.343485 |

*Statistically significant differences are highlighted.

# Table 22: Drumholm Site Onondaga Chert Differences*

| Area | Total N | | Area 1 | | Area 2 | | Area 4 | | Area 6 | | Area 9 | | Midden 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 5 | | 11 | | 17 | | 10 | | 5 | | 12 | |
| | | Freq | 0 | | 0.091 | | 0.529 | | 0.6 | | 0 | | 0.083 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 5 | 0 | | | | | | | | | | | | |
| Area 2 | 11 | 0.091 | 0.091 | 0.169966 | | | | | | | | | | |
| Area 4 | 17 | 0.529 | 0.529 | 0.237285 | 0.438 | 0.291878 | | | | | | | | |
| Area 6 | 10 | 0.6 | 0.6 | 0.303642 | 0.509 | 0.347975 | 0.071 | 0.38536 | | | | | | |
| Area 9 | 5 | 0 | 0 | 0 | -0.091 | 0.169966 | -0.529 | 0.237285 | -0.6 | 0.303642 | | | | |
| Midden 1 | 12 | 0.083 | 0.083 | 0.156095 | -0.01 | 0.230769 | -0.446 | 0.284024 | -0.517 | 0.341415 | 0.083 | 0.156095 | | |
| Midden 2 | 54 | 0.259 | 0.259 | 0.116847 | 0.168 | 0.206256 | -0.27 | 0.264494 | -0.341 | 0.325349 | 0.259 | 0.116847 | 0.176 | 0.194984 |
| Midden 4 | 14 | 0.071 | 0.071 | 0.134533 | -0.02 | 0.216766 | -0.458 | 0.27277 | -0.529 | 0.332111 | 0.071 | 0.134533 | -0.012 | 0.20607 |
| Midden 5 | 23 | 0.652 | 0.652 | 0.194673 | 0.561 | 0.25843 | 0.123 | 0.306923 | 0.052 | 0.360688 | 0.652 | 0.194673 | 0.569 | 0.249526 |
| Midden 6 | 26 | 0.5 | 0.5 | 0.192194 | 0.409 | 0.256567 | -0.029 | 0.305356 | -0.1 | 0.359356 | 0.5 | 0.192194 | 0.417 | 0.247597 |
| Midden 7 | 18 | 0.833 | 0.833 | 0.172306 | 0.742 | 0.242029 | 0.304 | 0.293246 | 0.233 | 0.349124 | 0.833 | 0.172306 | 0.75 | 0.232497 |
| Midden 9 | 18 | 0.167 | 0.167 | 0.172306 | 0.076 | 0.242029 | -0.362 | 0.293246 | -0.433 | 0.349124 | 0.167 | 0.172306 | 0.084 | 0.232497 |
| Midden 11 | 7 | 0.429 | 0.429 | 0.366651 | 0.338 | 0.404131 | -0.1 | 0.436735 | -0.171 | 0.476059 | 0.429 | 0.366652 | 0.346 | 0.398496 |

| Area | Total N | | Midden 2 | | Midden 4 | | Midden 5 | | Midden 6 | | Midden 7 | | Midden 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 54 | | 14 | | 23 | | 26 | | 18 | | 18 | |
| | | Freq | 0.259 | | 0.071 | | 0.652 | | 0.5 | | 0.833 | | 0.167 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Midden 4 | 14 | 0.071 | -0.188 | 0.178192 | | | | | | | | | | |
| Midden 5 | 23 | 0.652 | 0.393 | 0.227048 | 0.581 | 0.236636 | | | | | | | | |
| Midden 6 | 26 | 0.5 | 0.241 | 0.224926 | 0.429 | 0.234601 | -0.152 | 0.273562 | | | | | | |
| Midden 7 | 18 | 0.833 | 0.574 | 0.208189 | 0.762 | 0.218606 | 0.181 | 0.259975 | 0.333 | 0.258124 | | | | |
| Midden 9 | 18 | 0.167 | -0.092 | 0.208189 | 0.096 | 0.218606 | -0.485 | 0.259975 | -0.333 | 0.258124 | -0.666 | 0.243678 | | |
| Midden 11 | 7 | 0.429 | 0.17 | 0.38482 | 0.358 | 0.390554 | -0.223 | 0.415128 | -0.071 | 0.413971 | -0.404 | 0.405121 | 0.262 | 0.405121 |

*Statistically significant differences are highlighted.

# Table 23: Drumholm Site Local Till Chert Differences*

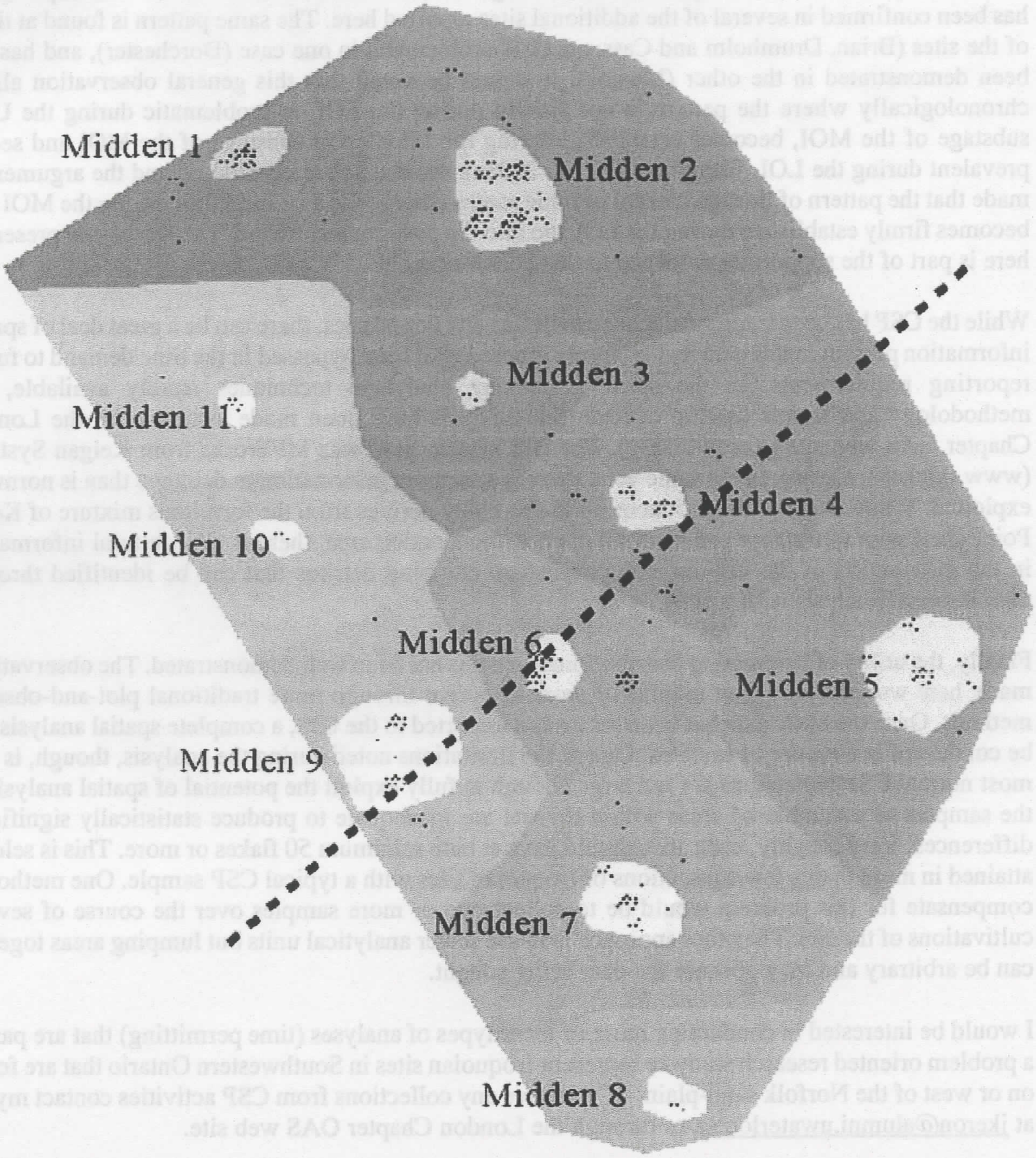
| Area | Total N | | Area 1 | | Area 2 | | Area 4 | | Area 6 | | Area 9 | | Midden 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 5 | | 11 | | 17 | | 10 | | 5 | | 12 | |
| | | Freq | 0.4 | | 0.545 | | 0.176 | | 0.3 | | 0 | | 0.333 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Area 1 | 5 | 0.4 | | | | | | | | | | | | |
| Area 2 | 11 | 0.545 | 0.145 | 0.520575 | | | | | | | | | | |
| Area 4 | 17 | 0.176 | -0.224 | 0.466014 | -0.369 | 0.345505 | | | | | | | | |
| Area 6 | 10 | 0.3 | -0.1 | 0.51485 | -0.245 | 0.408993 | 0.124 | 0.336817 | | | | | | |
| Area 9 | 5 | 0 | -0.4 | 0.429414 | -0.545 | 0.294282 | -0.176 | 0.18103 | -0.3 | 0.284031 | | | | |
| Midden 1 | 12 | 0.333 | -0.067 | 0.505472 | -0.212 | 0.397123 | 0.157 | 0.32223 | 0.033 | 0.389588 | 0.333 | 0.266655 | | |
| Midden 2 | 54 | 0.37 | -0.03 | 0.448308 | -0.175 | 0.321224 | 0.194 | 0.22216 | 0.07 | 0.31186 | 0.37 | 0.128775 | 0.037 | 0.296122 |
| Midden 4 | 14 | 0.5 | 0.1 | 0.502988 | -0.045 | 0.393957 | 0.324 | 0.31839 | 0.2 | 0.386359 | 0.5 | 0.261916 | 0.167 | 0.373772 |
| Midden 5 | 23 | 0.261 | -0.139 | 0.465417 | -0.284 | 0.344699 | 0.085 | 0.254927 | -0.039 | 0.33599 | 0.261 | 0.179488 | -0.072 | 0.321436 |
| Midden 6 | 26 | 0.462 | 0.062 | 0.470236 | -0.083 | 0.351179 | 0.286 | 0.263623 | 0.162 | 0.342635 | 0.462 | 0.191638 | 0.129 | 0.328375 |
| Midden 7 | 18 | 0.167 | -0.233 | 0.462694 | -0.378 | 0.341015 | -0.009 | 0.249923 | -0.133 | 0.332209 | 0.167 | 0.172306 | -0.166 | 0.317482 |
| Midden 9 | 18 | 0.389 | -0.011 | 0.484895 | -0.156 | 0.370578 | 0.213 | 0.28896 | 0.089 | 0.362491 | 0.389 | 0.225224 | 0.056 | 0.349043 |
| Midden 11 | 7 | 0.429 | 0.029 | 0.564651 | -0.116 | 0.470144 | 0.253 | 0.408908 | 0.129 | 0.463796 | 0.429 | 0.366652 | 0.096 | 0.453364 |

| Area | Total N | | Midden 2 | | Midden 4 | | Midden 5 | | Midden 6 | | Midden 7 | | Midden 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total N | 54 | | 14 | | 23 | | 26 | | 18 | | 18 | |
| | | Freq | 0.37 | | 0.5 | | 0.261 | | 0.462 | | 0.167 | | 0.389 | |
| | | Freq | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff | Diff Freq | SE of Diff |
| Midden 4 | 14 | 0.5 | 0.13 | 0.291861 | | | | | | | | | | |
| Midden 5 | 23 | 0.261 | -0.109 | 0.220904 | -0.239 | 0.317515 | | | | | | | | |
| Midden 6 | 26 | 0.462 | 0.092 | 0.230885 | -0.038 | 0.324538 | 0.201 | 0.262566 | | | | | | |
| Midden 7 | 18 | 0.167 | -0.203 | 0.21511 | -0.333 | 0.313511 | -0.094 | 0.248808 | -0.295 | 0.25771 | | | | |
| Midden 9 | 18 | 0.389 | 0.019 | 0.25944 | -0.111 | 0.345436 | 0.128 | 0.287996 | -0.073 | 0.295721 | 0.222 | 0.283576 | | |
| Midden 11 | 7 | 0.429 | 0.059 | 0.388608 | -0.071 | 0.450592 | 0.168 | 0.408227 | -0.033 | 0.413713 | 0.262 | 0.405121 | 0.04 | 0.430302 |

*Statistically significant differences are highlighted.

# Figure 6: Drumholm Site

## Cultural Areas



## CONCLUSIONS

The original hypothesis, derived from the analysis of the London Chapter excavations at the Harrietsville site, was that the pattern of differential distribution of Kettle Point chert within the site should be repeated on other Iroquoian sites if lineage control of trade routes occurred. This expectation has been confirmed in several of the additional sites reported here. The same pattern is found at three of the sites (Brian, Drumholm and Cassandra), is problematic in one case (Dorchester), and has not been demonstrated in the other (Mustos). It should be noted that this general observation aligns chronologically where the pattern is not present during the EOI, is problematic during the Uren substage of the MOI, becomes established during the Middleport substage of the MOI and seems prevalent during the LOI. Elsewhere (Keron 2003a), more data are considered and the argument is made that the pattern of lineage control of trade routes emerges as a cultural trait during the MOI and becomes firmly established during the LOI and into the post-contact period. The discussion presented here is part of the supporting evidence to that conclusion.

While the CSP has been traditionally used to define site boundaries, there can be a great deal of spatial information present in this data that is largely ignored or at least bypassed in the time demand to fulfill reporting requirements. In the spirit of making analytical techniques readily available, the methodology and scripts used to execute this analysis have been made available on the London Chapter OAS web site (Keron 2003c). The GIS system used was MFWorks from Keigan Systems (www.thinkspace.com). In the same vein, there is also more information in debitage than is normally exploited. While much of the productivity in this study derives from the fortuitous mixture of Kettle Point chert with Onondaga and local till chert in the London area, there is also cultural information in the distribution of the various reduction stage chipping detritus that can be identified through distributional analysis within sites.

Finally, the utility of automating distributional analysis has been well demonstrated. The observations made here would have taken months of work to derive through more traditional plot-and-observe methods. Once the basic data has been set up and imported to the GIS, a complete spatial analysis can be conducted in a matter of minutes. One of the limitations noted during the analysis, though, is that most normal CSP collections are not large enough to fully exploit the potential of spatial analysis as the samples of a number of areas within the site are inadequate to produce statistically significant differences. Very roughly, each area should have at bare minimum 50 flakes or more. This is seldom attained in more than a few subsections of Iroquoian sites with a typical CSP sample. One method to compensate for this problem would be to collect two or more samples over the course of several cultivations of the site. The other approach is to use fewer analytical units but lumping areas together can be arbitrary and may obscure the data being sought.

I would be interested in conducting more of these types of analyses (time permitting) that are part of a problem oriented research study or represent Iroquoian sites in Southwestern Ontario that are found on or west of the Norfolk sand-plain. If you have any collections from CSP activities contact myself at jkeron@alumni.uwaterloo.ca or through the London Chapter OAS web site.

## Acknowledgments

A number of people provided valuable assistance during the course of this study. Dr. Robert Pearce of the London Museum of Archaeology provided access to material from the Drumholme and Brian sites. Dr. Peter Timmins, assisted with the CSP at Mustos and Shari Prowse assisted with the field work at the Dorchester Village site and was always available and ready to discuss ideas and approaches or to share the monotony of lab time. In developing the analytical procedures, I am also indebted for discussions with both Dr. Micha Pazner of the Department of Geography and Dr. Tom Wonnacott of the Dept. of Statistics and Actuarial Science, both UWO. Last but not least, Dr. Chris Ellis spent many long hours reading this work and other material for my thesis this winter despite his teaching load and the distraction of a few hours of major surgery. Any errors and omissions remaining in the paper are entirely of my doing and could best be termed "in spite of" the time, efforts and good advice of all these people

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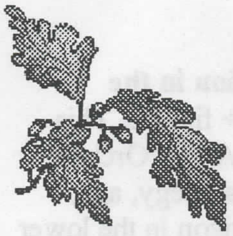

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## Sunday, September 28, 2003

**Sunrise Ceremony** 5 am
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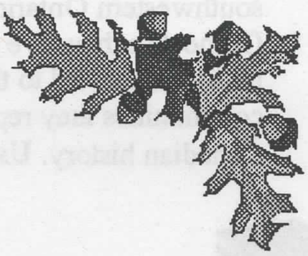

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